UNDERSTANDING INTERNATIONAL ENVIRONMENTAL SECURITY: A STRATEGIC MILITARY PERSPECTIVE

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Environmental security (ES), viewed as a process for addressing environmental issues potentially affecting U.S. national security, has significant implications for national military defense.

This paper analyzes the concepts, threats and opportunities. It uses a five-step development: paint an overview of the significance of ES; examine the knotty problems of ES definition; provide a "primer" in lay terms of the cross-cutting population trends and scientifically based environmental issues of climate change, land use and water use; using a geographic information systems analysis approach, analyze the total complex and list proposed, appropriate military missions; and summarize the national security implications of ES issues with recommended actions.

Major conclusions are:

- ES must be a component of the overall national security mission.
- The Services have an important, though supporting, role in ES initiatives.
- The least stable parts of the world from an ES standpoint are areas of Central and North Africa, the western Pacific Islands, the Ganges River basin and parts of Central and South America.
- Regional threat analysis is most effectively conducted by the geographic Commanders in Chief.
- The Theater Engagement Planning (TEP) process is the appropriate vehicle for military ES mission planning.

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EXECUTIVE SUMMARY

This paper addresses two key questions:

What is environmental security?

What is the military mission in environmental security and how should this mission be executed?

Environmental security is an ill-defined term that means different things to different groups of people. Even the Department of Defense (DOD) has no generally accepted definition for environmental security. DOD Directive Number 4715.1 is actually a list of programs and thus fails to truly define or give meaning to the term. In this paper, the following is used as a working definition: Environmental security is a process for responding, as part of the U.S. National Security Strategy, to those environmental issues having the potential to affect U.S. national security.

A risk-assessment approach was used to determine which environmental issues are or have the potential to become national security concerns. The issues specifically addressed in this paper are: global climate change (global warming, El Niño and La Niña, ozone depletion in the atmosphere); land use (deforestation, desertification, hazardous wastes); and water use (fresh water, oceans). Discussion of each topic includes an explanation—in lay terms—of the scientific basis for the problem and an overview of environmental and security impacts. Analysis of these critical environmental issues is preceded by an in-depth look at population growth trends. While population is not generally considered an "environmental" issue, studies have shown that a combination of population growth and resource depletion can lead to environmental resource scarcity, which is a cause or a contributing factor in most regional conflict.

The review of critical environmental security issues is followed by a strategic analysis of the national security implications of these issues. Analysis of the threat posed by environmental degradation indicates that (1) as a result of impacts on the most critical resources (croplands, forests, water, and fish), humans are threatened by loss of water and food and increased incidence of disease; (2) the greatest overall impacts from cumulative environmental change will occur in tropical countries, which are all economically developing countries; (3) global warming with its linkages to deforestation is the issue with the potential to cause

the greatest damage; and (4) issues related to water are major stress factors on human subsistence and economic development.

A geographic information systems (GIS) analysis was used to determine more precisely where environmental security problems and conflicts are likely to occur. In doing this analysis, it became clear that population is the controlling independent variable for all environmental security issues, and rate of natural increase is the best measure for correlating environmental impacts and areas of concern. (For example, it was determined that the highest rates of deforestation are occurring in countries with high population growth rates.) Geographic areas of greatest concern in terms of environmental security are: the Sahel and central regions of Africa; the island nations of the western Pacific; the East India/Bangladesh region; and isolated areas of Central and South America.

The paper then addresses the role of the military in environmental security. The military environmental security mission, as described in the National Military Strategy (NMS), is to support the National Security Strategy (NSS). International environmental security is primarily a diplomatic and political function of the Department of State. Many environmental security issues are not military responsibilities and, like other national security issues, require a coordinated effort of several agencies. Although the NSS recognizes the risks to national security posed by numerous environmental issues, there is at present neither a national-level strategic document addressing these risks nor a governmental structure for dealing with them.

Military support for the accomplishment of NSS environmental security goals is reflected in the NMS as “Shape, Respond, Prepare Now.” “Shape” includes promoting regional stability and preventing/reducing conflict and threats through actions that can prevent or, as much as possible, mitigate adverse impacts of environmental change. “Respond” entails smaller scale contingency operations where it has been determined that military capabilities are necessary to respond to a regional environmental security emergency in order to expedite reestablishment of peace and security or reduce human suffering. “Prepare Now” is manning, equipping, and resourcing for the missions of the future.

The analysis in this paper shows that most environmental security issues that could involve the military are likely to occur at the regional level; this means that primary activities will fall under the purview of the regional Commanders in Chief (CINCs). “Shape” should be addressed in the CINC theater engagement plan (TEP) process and “Respond” should be part of CINC operational contingency planning. “Prepare Now” must begin at the national policy level with a plan that can be supported by the DOD. While the paper presents a list of actions that can be undertaken by the military, it points out that, until an overarching plan is developed at the national level, the DOD will not have the guidance it needs to begin carrying out its supporting role.

A major challenge in developing an overarching plan is the fact that the answers to many questions relating to environmental security are uncertain. The issues are technically complex, there are many unknowns, and there is often a lack of consensus among experts. It is extremely difficult to quantify the future impacts of environmental change on U.S. security.

Nevertheless, certain things are clear. Unfettered human activities can damage our environment on a global scale. Whether or not one accepts as a reason for U.S. involvement this country's moral obligation, the bottom line is that isolationism in environmental protection is not achievable. It is not possible to separate our air from theirs, our water from theirs, or our health from "their diseases." Taking action will involve significant costs, but those costs will be cheaper than the costs of not addressing environmental security, soon.

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1. INTRODUCTION

What is environmental security?

What is the military mission in environmental security and how should this mission be executed?

Succinctly stated, these are the questions to be addressed in this paper. "Environmental security" is a term one now hears regularly bandied about by senior leaders involved in national security and defense affairs. Does this mean that environmental security is now an integral part of the way the United States conducts its national security business, or, as it often happens, is it a term of fashionable jargon enjoying its brief state of acceptance in defense culture?

Bernard Brodie, a noted scholar on war, in a speech at the Army Command and General Staff College once made a prophetic comment about the misuse of "jargon." He stated:

> It [jargon] gives us a sort of shorthand, wherein a mere phrase can convey a very considerable body of thought and mutual understanding, which is of course characteristic of specialized vocabularies in all sciences. The function of jargon is, to be sure, frequently abused by scholars who have forgotten how to write or think in English. [1]

Professor Brodie seems to have had a point in expressing this view before a military audience, and it was not to further their dislike of "academics." The military often use jargon without the requisite "mutual understanding" and this is specifically true in the case of the term "environmental security." During my years of military experience I have heard numerous senior Department of Defense officials make reference to environmental security, each obviously using the term in a different context. This doesn't mean that any of those senior officials were wrong, but reinforces the fact that environmental security means different things to different people and therefore must be employed with care. Chapter 2 will be devoted to sifting through the numerous definitions for environmental security available in military and academic writing today to formulate a definition of environmental security specific to the purpose of this study.

[1] Bernard Brodie, "The Worth of Principles of War," a lecture delivered on 7 March 1957 at the U.S. Army Command and General Staff College, Fort Leavenworth, Kans.

The impetus for this project originated in a growing sense that there are dramatic human-induced changes occurring in our environment, changes that are adversely affecting the Earth today and which, left unabated, will seriously impact the safety and security of our world in the future. A burgeoning population and its demands for natural resources, renewable and non-renewable, is leading this assault on the environment. Some consider technology a co-conspirator in the degradation of the environment. Certainly technology has evolved to the point that it can do great harm; conversely, technology can also heal and mitigate. Within this context, the overarching theme for this paper becomes,

> *Environmental degradation and environmental resource scarcity are of such a magnitude that they can become, if they are not already, an issue of national security (military and non-military) for the United States.*

There are several ways to use this book, depending on the reader's specific interests in environmental security. The science of environmental security is discussed in Chapter 3, with the non-scientist military and security professional as the target audience. Chapter 3 would be a good starting point for anyone wanting an introduction to such key environmental issues as global warming, damage to the ozone layer, deforestation, and desertification. Readers versed in the basics of environmental security issues may wish to only scan the topics in Chapter 3. Chapter 4 uses a qualitative risk-based approach to analyze the security impacts of environmental issues on a macro scale. While acknowledging that there are many uncertain issues relating to the future impacts of human-induced environmental change, it highlights what appear to be the major potential impacts of the environment on international security. Chapter 5 shapes environmental security into a military perspective for the planner at the regional geographic Commander in Chief (CINC) level.

1.1 The Environment and Security

The subject of this study is not new, particularly for the academic community where the environmental movement began. Many of the eminent scientists who advanced our understanding of the earth's environment were also the "doomsayers" (as they were characterized in their time) who predicted catastrophic environmental consequences of human activities. An unfortunate sideline in the early work on environmental security was that, as the concept developed, it was couched in the old civics debate of whether the government should spend money on "guns or butter." Norman Myers, an early environmental security scholar, expressed this view well when in 1986 he wrote,

> Hence national security is not just about fighting forces and weaponry. It relates to watersheds, croplands, forests, genetic resources, climate and other factors that rarely figure in the minds of military experts and political leaders, but increasingly deserve, in their collectivity, to rank alongside military approaches as crucial in a nation's security. [2]

In hindsight, it certainly appears that Myers was dead on target, at least in identifying future environmental security issues. It is also understandable that military leaders did not embrace his concepts, considering Myers's view that reduced military spending was the appropriate source for environmental security funding.

Today, the environmental security debate flourishes among social and political science scholars who work to redefine security, define environmental security, and devise political and social responses to environmental scarcities. Within the forum developed at the Woodrow Wilson International Center for Scholars, organized as the Environmental Change and Security Project, debate and discussion continue. Thomas Homer-Dixon,[3] Marc Levy, and others have helped develop and focus the early work of Norman Myers[4] and other scholars into a coherent understanding of how environmental issues can/will impact security in the future. Debates center primarily on defining security and applying the political sciences to analyze how developing countries will respond to environmental stress factors. Although these debates and discussions raise many challenging social issues, it is not a goal of this report to enter into that fray.

Previous research does offer important inputs for this study, which is focused on advancing our understanding of what the military mission should be. This body of work is intended to be an aid in identifying which, if any, of our worldwide environmental responsibilities are security concerns, and therefore should be included in our National Security Strategy and extend into our National Military Strategy.

However, this analysis is complicated by the political and social dimensions of government. The overall lack of a worthy adversary for the U.S. in a world without an Iron Curtain and a Cold War has required the development of new perspectives. Because of these bigger picture problems, we struggle with identifying and prioritizing issues such as environmental security, which heretofore have been lesser concerns.

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[2] Norman Myers, "The Environmental Dimension to Security Issues," *The Environmentalist* (1986): 251.
[3] Thomas Homer-Dixon, *Environmental Scarcity and Global Security* (New York: Foreign Policy Association, 1993).
[4] Norman Myers, *Ultimate Security: The Environmental Basis of Political Stability* (New York: Norton, 1993).

Predicting global climate change is challenging, but the environmental debate pales in light of the rhetoric concerning the new balance of power and security threats emerging as the political geography of the world restructures itself, mostly at the point of a gun. Samuel Huntington in his best selling *The Clash of Civilizations and the Remaking of the World Order*,[5] offered a brief review of the prevailing theories explaining political changes in the world today and predicting changes that will take place in the future. This review was followed by a presentation of his own theory on the subject, which is that an increased threat of violence arises from conflicts between peoples with different cultures.

While discussion of these different theories of political science is outside the scope of this project, it is disappointing to note that neither Huntington's theory nor any of the other theories he reviewed overtly considers environmental degradation as a primary source of conflict. Many of the theories, the Sheer Chaos Paradigm for example, have underlying threads in a number of the environmental issues discussed in this paper, but these theories suggest that everything else in the world is going to be so awful that environmental chaos will be hardly noticeable.

Were we to accept the Huntington view, this would be a relatively short essay, since according to him none of the environmental issues have a security component. However, others,[6] including this author, disagree, convinced that environmental issues may soon be major sources of conflict in the world. Rodney White, in his *North, South, and the Environmental Crisis*,[7] sees environmental security issues in terms of global hemispheres. In his view, the sources of conflict are the cumulative impacts of the environmental issues exacerbated by population growth and poverty in the Southern Hemisphere. Vice President Gore, one of our most environmentally competent political leaders, is deeply concerned with the potential damage to world order being brought on by environmental degradation.[8] The literature is filled with predictions of conflict over environmental issues, but the most striking evidence is in the records of actual conflict.

In a recent study, James Lee identified 70 separate modern era conflicts rooted in environmental issues.[9] The record shows that, dating back to 2500 BC, water has truly been something people will fight over. Today, this trend continues. James Gleick has identified 17

[5] Samuel Huntington, *The Clash of Civilizations and the Remaking of the World Order* (New York: Simon and Schuster, 1996).
[6] For example, Ambassador Richard Armitage, a senior U.S. diplomat and strategic analyst, specifically disagreed with Huntington's view on causes of insecurity and listed environmental concerns such as water scarcity as looming threats. 23 May 2000 lecture at the Naval War College.
[7] Rodney White, *North, South, and the Environmental Crisis* (Toronto: University of Toronto Press, 1993).
[8] Albert Gore, *Earth in Balance* (Boston: Houghton-Mifflin, 1992).
[9] James Lee, *Inventory of Conflict and Environment* (Atlanta, Ga.: AEPI, April 1999).

distinct incidents of armed conflict directly over access to water for human use in the period from 1945 to 1997.[10] There are many other works that support the existence of causal relationships between environmental issues and conflict, though the directness of the linkage is not often clear. An example of indirect linkage can be seen in issues relating to what the United Nations has characterized as "environmental refugees," people displaced by the combined effects of population growth, resource scarcity, and disease.[11] The military and security repercussions of refugee problems are amply documented in military after-action reports from Rwanda, Somalia, Ethiopia, and the Sudan.

As the magnitude and extent of such problems as deforestation and loss of arable land increase in the future, it is certainly plausible that these too could give rise to conflicts in many regions of the world, conflicts as serious as those documented by Gleick for water scarcity problems.

1.2 The Obligation of the United States

It is fairly clear that environmental degradation and resource scarcity are going to cause problems for many people in different places in the world, but how should the U.S. respond? One response could be that it is not our problem, because the U.S. possesses adequate resources and employs sound conservation measures. Another line of reasoning might contend that it is counter to our security to become involved, because use of any military capacity for international environmental security further hampers readiness and heaps more burden onto an already overtaxed military.

Why then should the U.S.—and specifically in terms of this study, the U.S. Armed Forces—become involved? There are three ways of approaching this question, each leading to the same conclusion. The three approaches are:

1. It is a moral requirement for the United States.

2. It is an obligation the U.S. has incurred.

3. Practical self-interest dictates it as the prudent action.

[10] Peter Gleick, *The World's Water* (Washington, D.C.: Island Press, 1998), 125-130.
[11] White, 96-97.

The first approach is based on the conviction that America is great because of its high ideals and moral commitment. America continues to send its troops into harm's way in cases where the primary rationale is a belief in the basic rights of all people. Actions in Kosovo, protecting the Kurds, and assisting refugees in Rwanda are examples of military actions primarily driven by our moral precepts. As will be shown in this study, environmental scarcity and degradation issues are at least as threatening to more of the innocent population of the world than the proliferation of landmines and AK-47s. This rationale has been well described by numerous scholars and in the final analysis is the overriding basis for the Vice President's call to action. It can be said that the first requirement of a superpower is that it be willing to act like one, to lead when the world has issues that require bringing people together.

No country in human history has ever so dominated the world in economic and military power as the United States today.[12] In its strength, the U.S. consumes vast quantities of the world's renewable and non-renewable resources and produces more waste than any country on earth. The Army teaches even the lowest ranks that maintaining a healthy living environment is important in protecting their own health and staying "fit to fight." By extension, maintenance of a healthy living environment in the rest of the world is essential to sustaining the American way of life. Because of its demand for resources and its production of waste, the U.S. has incurred an obligation to sustain the global environment that supplies the resources this country thrives on. The U.S. must participate in world efforts to reduce resource demands and adverse impacts on the world environment, and these actions should become components of U.S. environmental security strategy. This is the rationale behind the second approach.

The third approach reflects the pragmatist's view of the world, a view that sees international environmental security as being in our nation's best interest. The cost of cleaning up a mess is always higher than the cost of prevention. Trying to rebuild a denuded forest or restore a contaminated or depleted water supply are costly activities compared to educating people on sustainable development or on measures that can be taken to preserve water supplies. More directly related to the issues of this study, the cost of war resulting from environmental scarcity and degradation will be greater than many of the actions that can be undertaken to prevent conflict.

Whether viewing our responsibilities in terms of our position as a world power, or of our complicity in the crime of polluting the world environment, or even of pragmatic financial realities, one would reach the same conclusion: U.S. interests dictate that environmental security must be considered in national security policy making. In spite of the uncertainties

[12] Richard Danzig, Secretary of the Navy, lecture given at the Navy War College, June 2000.

associated with many environmental issues, the body of evidence confirming that humans are adversely impacting the environment on a global scale is irrefutable. Depletion of stratospheric ozone and the destruction of the Aral Sea are just two examples of global or large-scale anthropogenically generated changes in the environment. Something must be done and—for any of the reasons given above, or for all of them—environmental security should be a part of the American political agenda.

1.3 "National Security Strategy" and "National Military Strategy"

The U.S. National Security Strategy (NSS) for a New Century is the blueprint for all governmental actions associated with national defense and thus is the basis for strategic planning for the military. One of the "important national interests" identified in the December, 1999 NSS is "protecting the global environment from severe harm."[13] In defining our humanitarian and other interests, "promoting sustainable development and environmental protection"[14] is listed. Further, many of the human issues identified in the NSS have root causes in environmental problems. One example is refugee flow, which is listed as an important national interest. Environmental degradation is increasingly a major cause of mass migration, leading to starvation, epidemic disease, and the civil unrest that makes refugees a security concern. Overall, the NSS now recognizes that environmental issues are a significant national security concern and that they must be incorporated into our plan for preserving American security.

The NSS is the guide for all segments of national government as they map out their activities in pursuit of peace and security for our country. Environmental security is one of several issues raised in the NSS requiring coordinated actions from many agencies and departments, including but not limited to the Department of Defense (DOD). At present, the DOD, the U.S. Environmental Protection Agency (USEPA), the Department of Energy (DOE), and the Department of State (DOS) informally coordinate environmental security issues. Working groups and workshops meet on occasion to develop the relationships necessary to accomplish the NSS environmental requirements, but these efforts suffer because of their low priority within individual organizations and the absence of an overall national leader.

[13] The White House, *A National Security Strategy for a New Century* (Washington, D.C., 1999), 1.
[14] Ibid., 2.

Within the DOD, the environmental protection component of the NSS is addressed under the title "environmental security." Offices have been established within the DOD and programs are organized under the Deputy Under Secretary of Defense for Environmental Security.

The NSS provides the baseline guidance for the National Military Strategy (NMS). It then follows that, in developing and implementing the NMS, the Chairman of the Joint Chiefs of Staff must consider the environmentally related requirements of the NSS. The current NMS does in fact incorporate environmental protection threats. In its analysis of the strategic environment, the NMS states that "environmental strains continue to cause instability and the potential for violence."[15] Further, in discussing transnational dangers, the NMS notes that "massive refuge flow and threats to the environment each have the potential to put U.S. interests at risk."[16]

The threat analysis sections of both the NSS and the NMS provide consistent approaches to defining the risks to national security posed by numerous environmental issues. However, as the NMS moves into its strategic planning sections, the "how to address" environmental issues is absent. Certainly the NMS is a "big picture" strategic document and cannot cover all details for every security concern, but it is clear that the NMS strategy of "Shape, Respond, and Prepare Now" should include specific environmental actions as part of its response to its own threat analysis.

Given that the use of military power is only one way of protecting national security, differences between the NSS and the NMS are to be expected. As stated in the NMS, "The military is a complementary element of national power that stands with the other instruments wielded by our government."[17] Diplomacy through the Department of State and economic leverage are just two examples of how other government activities can be brought to bear on security issues. With regard to environmental protection, certainly the actions of the USEPA can directly contribute to meeting the environmental goals established in the NSS.[18]

Full accomplishment of NSS environmental objectives is hindered by the lack of a coordinated plan at the national government level. This paper addresses primarily the military departments' responses, but many environmental security issues are not military responsibilities and other issues will require a coordinated effort of several agencies. While the DOD continues to provide leadership in coordinating with other agencies and at the same

[15]Chairman, Joint Chiefs of Staff, *National Military Strategy* (Washington, D.C., 1997), 8.
[16] Ibid., 9.
[17] Ibid., 5.
[18] USEPA, *Environmental Security* (Washington, D.C., 1999).

time developing and implementing the plans and activities necessary to meet its assigned responsibilities within the NSS, there is neither a national-level strategic planning document nor, as mentioned earlier, and overall national leader. Chapter 4 will make a first attempt to identify the military and non-military responsibilities relating to environmental security issues and suggest a new governmental structure for environmental security operations.

1.4 A Risk-Assessment Approach

In the course of this paper it will become clear that our scientific ability to predict environmental consequences of anthropogenically induced change is somewhat less than our ability to predict next week's weather. Competent scientists can look at the same set of data and reach diametrically opposite conclusions. A case in point is global warming, alias the greenhouse effect, alias carbon dioxide pollution of the global environment.

While the concept of global warming will be explained in detail in Chapter 3, we can use it here as an example. It is simple enough to deduce that adding too much carbon dioxide to the air is a bad thing, which will produce specific consequences: i.e., the earth warms, the ice caps melt, and we create a water world. However, other factors enter in, such as the interactions of the carbon cycle, concurrent changes to the environment, and natural regulating mechanisms. The result is an extremely complex system that is very difficult to interpret. So, if one surveys the literature, one finds recognized scientists predicting warming, cooling, major climate changes, minor climate changes, and all points in between. As with nearly all issues to be examined in this report, there are facts known with certainty, there are data collected over a relatively short period of geologic time, and there is the current level of scientific understanding to analyze and interpret the information. In total, we are left with a range of ideas and alternative views of the future, each lacking the precision or certainty we desire.

Given the uncertainties and ambivalence characterizing the current understanding of human impact on the environment, meaningful research requires making some fundamental assumptions concerning the extent and magnitude of the impacts of anthropogenically induced change. The risk-assessment model that is often employed to quantify consequences of environmental contamination events provides a logical framework within which to conduct our analysis. According to this model, the total risk of an event is defined as:

RISK = probability of the event occurring x severity of the impact (1-1)

A hypothetical example should help to illustrate the concept. Assume that each time a person rides in a car he or she is subjected to the risk of an injury. The probability of an injury can be expressed in several ways, including: (1) there is a 1/10,000 chance of an injury each time a person rides in a car, or (2) on average, a person will be injured once for each 100,000 miles he or she rides. These numbers would be based on statistical analysis of actual data generated through accident reporting.

For the second term in Equation 1-1, the severity of the accident must be expressed in quantitative terms. One way of expressing the severity of the injury might be: for each person injured in a car accident, 1 out of 100 people die. A person's total risk of dying in a car accident in this example is then:

$$\text{RISK} = (1/100{,}000) \times (1/100) = 1/10{,}000{,}000 \qquad (1\text{-}2)$$

Expressed in words, a person has a one in ten million chance of dying for each 100,000 miles of riding in a car. Risk, then, is the chance of occurrence multiplied by the magnitude of the consequence.

As demonstrated by this example, under uncertain conditions a risk-based approach provides an effective evaluative tool for predicting future consequences and can be particularly useful in comparing alternatives. Risk analysis suggests that either of two conditions can transform an environmental issue into a national security issue, these two conditions being either a high probability of occurrence or impacts so dire that every possible alternative of avoidance or mitigation should be considered. Applying this model to our global warming example, we can see that, while we have no good estimate for the probability of occurrence, it is generally recognized that potential impacts would be destabilizing on a worldwide basis and, therefore, prudence necessitates consideration of global warming as a national security issue. This is the approach that was taken in selecting the critical environmental issues that will be examined in this report.

1.5 Goals and Purpose of This Research

The goal of this work is to produce a document that meets standards for good academic research, which is to advance the body of understanding in environmental security, and also passes the common sense or utility test. Early research into the subject of environmental security quickly revealed that the needs for study fell into two general categories.

First was the need for a primer on environmental issues and how they relate to national security. A recent finding from a plenary session of several governmental agencies involved in environmental security studies listed an *environmental security primer* as essential to strengthening our national environmental security strategy. From the military perspective, the senior leadership must understand environmental security issues from both a scientific and a policy view. The target audience for this document is therefore the geographic Commanders in Chief (CINCs) and their staffs. In military environmental security activities, CINCs have important roles to play, although they each arrive in the position with vastly different levels of knowledge on the environmental security issues. This document, particularly Chapter 3, is intended to jump-start a commander's understanding of the subject.

The second contribution to be made by this study is *to begin the strategic analysis process for the military.* Following the risk model described above, issues can be analyzed on the basis of national, then military impacts. Chapter 4 includes an analysis of specific environmental issues that threaten stability and peace. This is followed by an assessment of those issues that are relevant to military activities or have solutions within the defense component of the government and a discussion of the specifics of the military's emerging environmental security mission.

As with everything that the military accomplishes, the key to success will be careful analysis and planning. Military planners and operators need support in defining issues, assessing potential concerns, and developing plans that best utilize military capabilities and experience. At the national level, the military response should fit into a larger plan designed to achieve the goals of the NSS. This research found no evidence of detailed environmental security planning, nor of planning integration at the NSS level. Comments in this paper relating to needs in national level planning are included only to the extent required to develop a context for military activities as one component of national security strategy.

There is much work to be done in achieving a final environmental security strategy for the nation and the DOD. This study offers the following contributions toward planning and executing this mission:

1. An overview of critical environmental issues to help educate our leadership on the scientific basis of the concepts. (Chapter 3)

2. An analysis of strategic options in military environmental security policy. This includes a threat assessment to identify the most critical issues, a global scale geographic analysis to highlight the regions of greatest concern, and a listing of proposed military environmental security missions. (Chapter 4)

3. Finally, a summary of the national security implications of environmental issues and recommendations for action. (Chapter 5)

Many readers will not be familiar with some units of measure and scientific terms that appear in this document. Appendix A provides a listing with explanations of commonly used units of environmental measure. Throughout the document, terms and abbreviations are defined at first use; expanded definitions and a listing of all abbreviations can be found in Appendix B.

2. ENVIRONMENTAL SECURITY DEFINED

Chapter 1 introduced Professor Bernard Brodie and his views concerning the misuse of jargon, along with this author's opinion that "environmental security" is an often misused and regularly misunderstood term in military culture today. There is ample evidence to support this view: 20+ definitions for environmental security are readily available in recent government publications.

The concept of environmental security seems to have originated with the early work of Norman Myers[1] and others who focused on environmental issues with the potential to impact international security or world peace. It has since evolved into a term applied to encompass a broad range of activities, the only common element being some form of the word "environment" in their title.

At the outset of this research it was assumed that senior military leaders understood the definition of environmental security, but lacked an understanding of the underlying scientific basis for the environmental issues. However, as this research progressed and many divergent definitions of environmental security emerged, it became evident that there is no generally accepted definition of environmental security within the Department of Defense (DOD).

The real proof of the existing confusion came from hearing the term "environmental security" used by our senior DOD officials. At the most recent U.S. Army Senior Environmental Leadership Conference held in March 2000, the term was used frequently, but each time in a different context and with a different meaning. For a three-star general active in managing the Army force structure, environmental security meant a force protection issue, keeping deployed forces safe from environmental hazards in their areas of operation. Another senior officer used the term in reference to garrison environmental health and safety programs, in the context of compliance with state and federal regulations. Within the 20+ definitions found in the literature, both of these generals were correct, though it would be difficult to ever be wrong given the broad range of definitions currently in use.

[1] Norman Myers, "The Environmental Dimension to Security Issues," *The Environmentalist* (1986): 251-57.

2.1 Existing Definitions of Environmental Security

A recent international study sponsored by the Army Environmental Policy Institute devoted specifically to defining environmental security formally documented the existing confusion,[2] but was not able to resolve the definition problem. One option considered early in this research was to devise a new term specific to the environmental requirements of the National Security Strategy and the National Military Strategy. Such an approach would decouple the important national security issues from the baggage of confusion now encumbering the term "environmental security." This approach was rejected, because common sense suggested that there is already enough jargon and, from a philosophical standpoint, generating a new term seemed counterproductive in any effort to reduce the confusion that has been created by military jargon.

This study, however, requires a clear working definition of the term "environmental security." In developing a working definition, various sources were consulted. Presented below are several definitions extracted from a number of these sources. The differences give some indication of the wide range of meanings associated with the term.

United States Environmental Protection Agency

> Environmental security is a process whereby solutions to environmental problems contribute to national security objectives. [3]

An Academically Inspired Definition

> Environmental security is the proactive minimization of anthropogenic threats to the functional integrity of the biosphere and thus to its interdependent human component.[4]

Army Environmental Policy Institute (AEPI) Study

The AEPI study did not develop a specific definition, but defined the key elements that would describe a state of environmental security as:

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[2] Jerome Glenn and others, *Defining Environmental Security: Implications for the U.S. Army* (Atlanta, Ga.: AEPI, 1998).
[3] USEPA, *Environmental Security* (Washington, D.C., 1999), 1.
[4] An interesting definition found in the literature without specific reference.

1. Public safety from environmental dangers caused by natural or human processes due to ignorance, accident, mismanagement, or design.
2. Amelioration of natural resource scarcity.
3. Maintenance of a healthy environment.
4. Amelioration of environmental degradation.
5. Prevention of social disorder and conflict (promotion of social stability). [5]

DOD Directive Number 4715.1, Environmental Security

The DOD official definition is actually a list of programs encompassed under the title "Environmental Security" and thus fails to truly define or give meaning to the term:

> Definitions: 2. Environmental Security. The environmental security program enhances readiness by institutionalizing the Department of Defense's environmental, safety, and occupational health awareness, making it an integral part of the Department's daily activities. Environmental security is comprised of restoration, compliance, conservation, pollution prevention, safety, occupational health, explosive safety, fire and emergency services, pest management, environmental security technology, and international activities which are explained, as follows:
>
> a. Restoration is identification, evaluation, containment, treatment, and/or removal of contamination so that it no longer poses a threat to public health and the environment.
>
> b. Compliance is meeting applicable statutory, Executive order, and regulatory standards for all environmental security functions, including FGS or the Overseas Environmental Baseline Guidance Document, as appropriate.
>
> c. Conservation is planned management, use, and protection; continued benefit for present and future generations; and prevention of exploitation, destruction, and/or neglect of natural and cultural resources.
>
> d. Pollution prevention is source reduction as defined in 42 U.S.C. 13101-13109 (reference [nn]), and other practices that reduce or eliminate the creation of pollutants through increased efficiency in the use of raw ma-

[5] Glenn and others, 19.

terials, energy, water and other resources, or protection of natural resources by conservation.

e. Safety is a multifaceted program designed to prevent accidental loss of human and material resources, and protects the environment from the potentially damaging effects of DoD mishaps.

f. Occupational health protects personnel from health risks, and includes occupational medicine, illness and injury trend analysis, epidemiology, occupational health nursing, industrial hygiene, and radiological health.

g. Fire and emergency services enhance combat capability by preserving life and DoD property through fire suppression, fire prevention, fire protection engineering, and emergency responses.

h. Explosives safety protects personnel, property, and military equipment from unnecessary exposure to the hazards associated with DoD ammunition and explosives; and protects the environment from the potentially damaging effects of DoD ammunition and explosives.

i. Pest management is the prevention and control of disease vectors and pests that may adversely affect the DoD mission or military operations; the health and well-being of people; or structures, material, or property.

j. Environmental security technology consists of research, development, test and evaluation, and regulatory certification of innovative technologies responsive to user needs.

k. International environmental activities include bilateral or multilateral agreements, information exchanges, cooperative agreements, and specific actions; consistent with the responsibilities identified in subsection E.3. above to bring DoD resources to bear on international military-related environmental matters or otherwise appropriate in support of national defense policy interests. [6]

[6] DOD, *Environmental Security* (Directive Number 4715.1, February 1996).

2.2 A Working Definition for This Research

This paper uses the term "environmental security" in a much more restrictive manner than the DOD directive definition given above and applies it more specifically to international defense security issues than do the other definitions listed here, thus leaving this researcher in the uncomfortable position of needing to create yet another definition for environmental security. The definition presented below sets the boundary conditions for all the work that will follow and is NOT purported to be the final, inclusive definition of "environmental security."

With these caveats, the definition for environmental security as it is applied in this research is:

> Environmental security is a process for effectively responding to changing environmental conditions that have the potential to reduce peace and stability in the world and thus affect U.S. national security. U.S. environmental security involves accomplishment of the environmentally related actions specified in the National Security Strategy. Accomplishing U.S. national environmental security goals requires planning and execution of programs to prevent and/or mitigate anthropogenically induced adverse changes in the environment and minimize the impacts of the range of environmental disasters that could occur**.**

This definition focuses on meeting the established goals of the NSS, which should be the basis for all U.S. security planning, and specifically on the DOD responsibilities of the NSS. This DOD role should necessarily be a part of the National Military Strategy published by the Chairman of the Joint Chiefs of Staff. [7]

There are both positives and negatives associated with environmental security issues. Three negatives that immediately come to mind are global climate change producing catastrophic suffering, mass migrations of people searching for water and other scarce resources, and deforestation of irreplaceable tropical forests.

However, there are also positives, especially in terms of the military. One of the most promising elements of the current DOD environmental security program is the forging of cooperative relationships with other countries through the sharing of military environmental protection and management practices. Many of the most positive military exchanges with the

[7] Gary Vest, "DOD International Environmental Activities," *Federal Facilities Journal* (Spring, 1997): 8.

countries emerging from the former Soviet bloc have related to environmental issues. Such opportunities have a double benefit for the DOD, building better military-to-military bridges while directly affecting important strategic concerns, such as political stability, economic development, and peace.

Our task, as this research now proceeds, is to identify the most important environmental scarcity and degradation issues and then find the best ways to employ the military in addressing these issues.